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EXAMINER

STOUFFER, KELLY M

ART UNIT PAPER NUMBER

1762

DATE MAILED: 10/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/811,591

Applicant(s)

LU, DONGHUL

Examiner

Kelly Stouffer

Art Unit

1762

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 12-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☒ Claim(s) 1-20 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 March 2004 is/are; a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-11, drawn to a method, classified in class 427, subclass 569.
 - II. Claims 12-20, drawn to a product, classified in class 438, subclass 758.

The inventions are distinct, each from the other because of the following reasons:

Inventions in groups I and II are related as process of making and product made.

The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the process as claimed can be used to make another and materially different product such as film layers not intended to be a part of a semiconductor.

Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions have acquired a separate status in the art in view of their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are independent or distinct for the reasons given above and there would be a serious burden on the examiner if restriction is not required because the inventions require a different field of search (see MPEP § 808.02), restriction for examination purposes as indicated is proper.

During a telephone conversation with Gordon Lindeen on 23 October 2006 a provisional election was made with traverse to prosecute the invention of the method, claims 1-11. Affirmation of this election must be made by applicant in replying to this Office action. Claims 12-20 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Drawings

2. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: block 328 in paragraph 0028 of the specification. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities: LAN port 69 in paragraph 0036 should be --LAN port 969--.

Art Unit: 1762

Appropriate correction is required.

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: The specification does not provide proper antecedent basis for the limitations in claim 9. The specification on pages 9 and 10 allow for the wafer to be moved in between nitrogen sources and to different areas of the CVD chamber, but it does not describe moving nitride supply fixtures to form layers on the substrate. It is questionable how exactly to move nitride supply fixtures relative to the substrate.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 9 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. It is uncertain how one of ordinary skill in the art would be able to move nitrogen fixtures relative to the substrate as it is written in claim 9.

Art Unit: 1762

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8-11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 recites the limitation "pumping away residue gases...before reapplying the plasma power". There is insufficient antecedent basis for this limitation in the claim. Claim 8 depends upon claim 1 and there is not a step of reapplying plasma power present in the limitations of claim 1, therefore it is uncertain when to pump away residue gases.

Claims 9 and 10 recite the limitation "the second portion of the layer" in line 4 of claim 9 and line 3 of claim 10. There is insufficient antecedent basis for this limitation in the claim. Claims 9 and 10 depend upon claim 1 which does not include a second portion of a layer and it is confusing where these limitations should occur in the method when referencing claim 1.

Claim 11 recites the limitation "the nitride supply" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

Art Unit: 1762

the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 1-8 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent number 6818517 to Maes in view of US Patent publication 2004015845 to Nguyen et al.

Regarding claims 1 and 2, Maes discloses applying plasma power to form a film by generating plasma and flowing a deposition gas during the plasma deposition simultaneously or in pulses. The nitride is deposited and the plasma power is shut off. (Column 5 lines 22-43) Maes does not include this layer as part of a first portion of a layer then repeating this process to form a second layer. Nguyen et al. teaches depositing a first portion of a layer then repeating the process to form a second layer (abstract, Figure 4 and paragraph 0049) during a process that offers advantages over the method of Maes including lower temperature reactions for modern semiconductor processing (paragraph 0004), to deposit films of high coverage on a not-flat substrate such as vias or trenches in semiconductors (paragraph 0010), minimize process time and enhance film quality (paragraph 0049).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Maes to include the nitride layer as part of a first portion of a layer then repeating this process to form a second layer as taught by Nguyen et al. in order to take advantage of lower temperature reactions for modern semiconductor processing, to deposit films of high coverage on a not-flat substrate such as vias or trenches in semiconductors, minimize process time and enhance film quality.

Regarding claim 3, Maes uses silane as a deposition gas in column 5 line 31.

Regarding claim 4, Maes discloses that silane may be pulsed during the nitrogen plasma deposition. One of ordinary skill in the art would recognize the capability of the first pulse or any pulse thereafter occurring at least more than 0.5 seconds after applying the plasma.

Regarding claim 5, Maes includes by reference in entirety US patent 6544900 to Raaijmakers et al. that includes the silane gas flowing through process chamber 12 in Figure 2 before being removed by a vacuum pump.

Regarding claims 6 and 7, Maes discloses using nitrogen and ammonia as plasma gases in column 5 lines 23-46. In addition, one of ordinary skill in the art would recognize that a plasma of nitrogen as disclosed by Maes would not be possible without initiating a gas flow to start the plasma.

Regarding claims 8 and 11, Nguyen et al. discloses purging after each step of depositing parts of the film and depositing parts of the film until the desired thickness, or complete film, is reached, in Figure 4.

Art Unit: 1762

Regarding claim 10, Raaijmakers et al. includes a chamber that is equipped to process many substrates (Figure 1) that would include the capability of moving the substrates in between processing steps.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Taguchi et al. shows a similar procedure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kelly Stouffer whose telephone number is (571) 272-2668. The examiner can normally be reached on Monday - Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

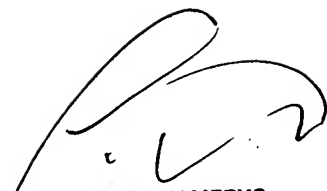
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Application/Control Number: 10/811,591
Art Unit: 1762

Page 9

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Art Unit 1762

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